

Pursuant to 37 C.F.R. § 1.111, reconsideration of the present application in view of the foregoing amendments and the following remarks is respectfully requested.

The present invention relates to a fiber which includes a thermoplastic polymer and particles of a ferroelectric material dispersed therein. The thermoplastic polymer may be, for example, a polyolefin, such as polypropylene or polyethylene, and the ferroelectric material may be barium titanate. The ferroelectric material may be present at a level of from about 0.01 to about 50 percent by weight (from about 0.001 to about 13 percent by volume), and will have a longest particle dimension in a range of from about 10 nanometers to about 10 micrometers. The fiber may be exposed to an electric field. A plurality of the fibers may be employed to form a knitted or woven fabric or a nonwoven web. Also provided is a method of preparing fibers containing particles of a ferroelectric material. The method includes deconstructing the ferroelectric material in the presence of a liquid and a surfactant to give destructured particles; the liquid is a solvent for the surfactant and the surfactant is adapted to stabilize the destructured particles against agglomeration. A blend of the stabilized, destructured ferroelectric material particles and a thermoplastic polymer then is formed and extruded to form fibers. The extruded fibers may be collected on a moving foraminous support to form a nonwoven web and, if desired, may be exposed to an electric field. The fiber of the present invention, especially when in the form of a nonwoven web, is especially suited as a filtration medium. For example, the nonwoven web may be adapted to remove particulate matter from a gaseous stream.

In the November 28, 2000 Office Action, the Examiner noted that the trademark "TICON 5016" should be capitalized and accompanied by its generic form. The amendments to the specification above address the Examiner's concern and it is believed no further action on that point is required.

Response to Rejections under 35 U.S.C. § 103

By way of the Office Action mailed November 28, 2000, the Examiner rejected Claims 50 and 55-67 under 35 U.S.C. §103(a), as being unpatentable over U.S. Patent No. 6,001,299 to Kawabe et al. In view of Japanese Patent Abstracts JP60126310A of Mitsubishi and JP 63288216A of Oshida. The Examiner contends Kawabe teaches an electret article which in its final shape is a face mask and comprises a fibrous porous article such as a nonwoven fabric, wherein the nonwoven fabric can be meltblown or spunbonded thermoplastic material with ferroelectric materials such as barium titanate incorporated therein. The Examiner contends that while Kawabe is silent as to the

amount of barium titanate incorporated therein, Mitsubishi and Oshida each teach thermoplastic fibers having ferroelectric material incorporated therein in the amount set forth by the Applicants. The Examiner further concludes that it would have been obvious to one skilled in the art to include the ferroelectric material of Kawabe in an amount as known in the art with the reasonable expectation of obtaining the efficacious properties associated therewith. The Examiner also suggests the fiber diameters of the present invention are inherent based on the disclosure of Kawabe, and as such, Claims 50 and 55-67 of the present invention would have been obvious to one skilled in the art.

The Applicants respectfully disagree with the Examiner's statements for a number of reasons. First, Kawabe teaches the addition of barium titanate does not enhance the electret field outside an electret article. In fact, as seen in column 5, lines 51-53 of Kawabe, the Kawabe reference actually teaches away from the technology disclosed in the present application. In view of this teaching it is respectfully submitted that the Kawabe reference is an improper citation and that all rejections which depend in whole or in part thereon should be withdrawn.

Second, Kawabe teaches composites of inorganic piezoelectric ceramics with organic rubbers and thermoplastics like polyvinylidene fluoride and polyacetals; however, the reference does not teach BaTiO_3 and polyolefin (e.g. polypropylene) composite material. The two thermoplastics taught by Kawabe are each inherently different from polyolefins. Polyvinylidene fluoride (PVDF) is itself a ferroelectric polymer, unlike polyolefins (incl. polypropylene). Polyacetals are aliphatic polyethers, and unlike polyolefins, such condensation polymers are not useful for forming electrets; there are no known references in Chemical Abstracts to the use of polyacetals as electrets. Accordingly, as there is no suggestion or teaching to the contrary found in Kawabe or either of the Japanese Patent Abstracts cited by the Examiner, one skilled in the art would not have looked to Kawabe for a teaching related to the present invention.

Third, the Applicants also believe the Examiner's reliance on the cited Japanese Patent Abstracts is inappropriate. JP 63288216A discloses 10-80wt% electroconductive particles and 0.1-10wt% of dielectric particles. The combination of these particles acts as an anti-static agent. This Japanese Abstract does not teach an electret material, i.e. a material having a sustained electrostatic charge. Removing the electroconductive particle from the invention disclosed in the '216 abstract, as the Examiner seems to have suggested, would give rise to a material which is no longer an anti-static agent and therefore would destroy the inventor's original intent and be against all of the teachings

therein. Furthermore, because the teachings of the '216 abstract is counter-instructive to that suggested by the Examiner, there appears to be no motivation for the Examiner's suggestion that one skilled in the art would have removed the electroconductive particle in '216 reference to achieve the invention of the present application. That is one skilled in the art would not seek to form an electret and impart a permanent electrostatic charge to an anti-static fiber. Moreover, since the fibers of the Japanese Abstract comprise anti-static fibers that contain a considerable amount of electroconductive particles it is believed uncertain as to whether it would be possible to form an electret from such materials.

JP 0126310A discloses an anti-static fiber containing semiconducting barium titanate (BaTiO_3). Semiconducting BaTiO_3 is formed by sintering ultra high purity BaTiO_3 with La, Ce, Sm, Nb, Ta or Sn. The BaTiO_3 is doped in order to make it electrically semi-conductive. In this regards, doping the BaTiO_3 replaces lattice barium atoms with other metal atoms (e.g. Ce, La, etc.) resulting in the formation of a material with a different chemical stoichiometry. Moreover, these doped semiconductor materials are not dielectrics. The Examiner's suggestion that the doped BaTiO_3 is both semiconducting and dielectric goes against the fundamental teachings known to those skilled in the art. Anti-static fibers and electret fibers are diametrically opposite things. The one does not support any electrical charge while the other is, by definition, electrically charged. (See Exhibit A, a compilation of relevant definitions as taken from the 60th Edition of the CRC Handbook of Chemistry and Physics.) Thus the '310 abstract does not teach the use of a ferroelectric material. Furthermore, one skilled in the art would not seek to form an electret and impart a permanent electrostatic charge to an anti-static fiber.

It is the Applicants' contention that the Examiner's rejection of the Claims 50 and 55-67 under 35 U.S.C. §103 over Kawabe in view of the cited Japanese Abstracts is improper and should be withdrawn, as Kawabe teaches away from adding BaTiO_3 , and there is no suggestion or motivation which would suggest that one skilled in the art would look to Kawabe for a material to which to add the particles in the Japanese Abstracts even if the Examiner's interpretation and resulting conclusions concerning the substitution of semiconductive materials for ferroelectric materials were not erroneous.

Lastly, the Examiner has objected to Claims 9 and 12-16 as being dependent upon a rejected base claim, but notes that the claims would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening


claims. Applicants respectfully submit that the base claims to which the Examiner refers in her objection are allowable in the current form and once allowed all of the remaining claims which depend thereon are also in condition for allowance. Accordingly, in light of the arguments set forth above, the Applicants do not believe any action is required with respect to Claims 9 and 12-16 at this time.

Applicants have carefully reviewed the art cited against the present application. None of the cited references, either alone or in combination, disclose a composite construction which has the same or similar distinctive combination of features as set forth and claimed by the present application and it is this combination of elements which is clearly and patentably distinguishable over the cited art. All claims are believed to be patentably distinguishable over the cited references and in allowable condition. Applicants respectfully request that the rejections of the claims under 35 USC §103 be reconsidered and withdrawn in light of the preceding remarks.

For the foregoing reasons, the application and claims are believed to be in condition for allowance and such action is respectfully requested. However, should any questions arise with regard to this matter the Examiner is encouraged to contact the undersigned at (770)-587-7183. Please charge any prosecutorial fees which are due to Kimberly-Clark Worldwide, Inc. deposit account number 11-0875.

Respectfully submitted,

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CERTIFICATE OF MAILING

I, William W. Letson, hereby certify that on February 27, 2001 this document is being deposited with the United States Postal Service as first-class mail, postage prepaid, in an envelope addressed to: Assistant Commissioner for Patents, Washington, D.C. 20231.

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